NATICOOK LAKE

2018 SAMPLING HIGHLIGHTS

Station – 1 Deep

Merrimack, NH

Station 1 Deep (Figure 8) was used as a reference point to represent the overall Naticook Lake water quality. Water quality data displayed in Tables 1 and 2 are surface water measurements with the exception of the Dissolved Oxygen data.

Blue = Oligotrophic

Yellow = Mesotrophic

Red = Eutrophic

Gray = Not Assessed

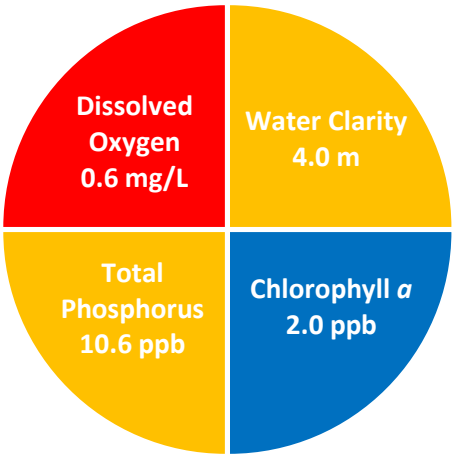


Figure 1. Naticook Lake Water Quality (2018)

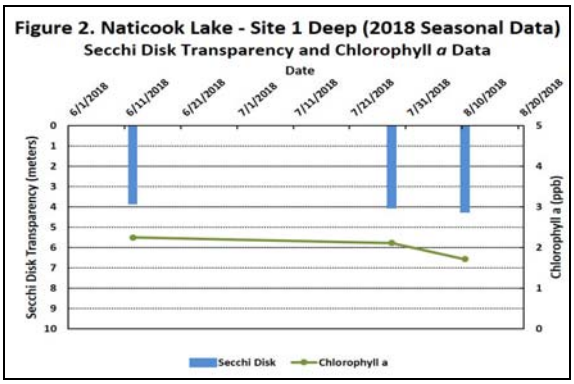
Table 1. 2018 Naticook Lake Seasonal Averages and NH DES Aquatic Life Nutrient Criteria[1]

Parameter	Oligotrophic	Mesotrophic	Eutrophic	Naticook Lake Average (range)	Naticook Lake Classification
Water Clarity (meters)	4.0 – 7.0	2.5 - 4.0	< 2.5	4.0 meters (3.8 – 4.2)	Mesotrophic
Chlorophyll *a* [1] (ppb)	< 3.3	> 3.3 – 5.0	> 5.0 – 11.0	2.0 ppb (1.7 – 2.2)	Oligotrophic
Total Phosphorus [1] (ppb)	< 8.0	> 8.0 – 12.0	> 12.0 – 28.0	10.6 ppb (8.2 – 12.4)	Mesotrophic
Dissolved Oxygen (mg/L)	5.0 – 7.0	2.0 – 5.0	<2.0	0.6 mg/L (0.2 – 4.5) *	Eutrophic *

* Dissolved oxygn concentrations were measured on August 10, between 2.5 and 4.9 meters, in the layer of rapidly decreasing temperature.

Table 2. 2018 Naticook Lake Seasonal Average Accessory Water Quality Measurements

Parameter	Assessment Criteria					Naticook Lake Average (range)	Naticook Lake Classification
Color (color units)	< 10 uncolored	10 – 20 slightly colored	20 – 40 lightly tea colored	40 – 80 tea colored	> 80 highly colored	**23.3** color units (range: 22.4 – 24.2)	Lightly tea colored
Alkalinity (mg/L)	< 0.0 acidified	0.1 – 2.0 extremely vulnerable	2.1 – 10 moderately vulnerable	10.1 – 25.0 low vulnerability	> 25.0 not vulnerable	**18.2** mg/L (range: 18.0 – 18.5)	Low Vulnerability
pH (std units)	< 5.5 suboptimal for successful growth and reproduction		6.5 – 9.0 optimal range for fish growth and reproduction			**7.4** standard units (single value)	Optimal range for fish growth and reproduction
Specific Conductivity (*u*S/cm)	< 50 *u*S/cm Characteristic of minimally impacted NH lakes		50-100 *u*S/cm Lakes with some human influence	> 100 *u*S/cm Characteristic of lakes experiencing human disturbances		**275.8** *u*S/cm (single value)	Characteristic of lakes experiencing human disturbances



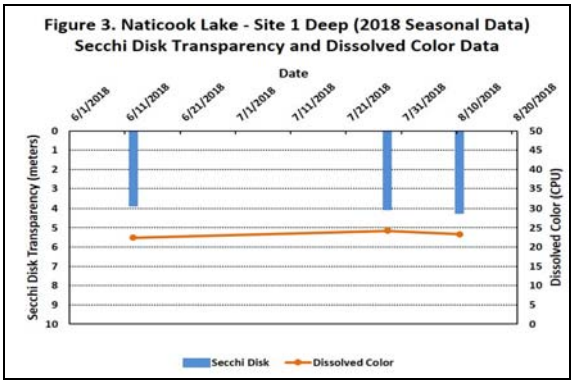


Figure 2 and 3. Seasonal Secchi Disk transparency, chlorophyll *a* changes, and dissolved color concentrations. Figures 2 and 3 illustrate the interplay among Secchi Disk transparency, chlorophyll *a*, and dissolved color. Shallower water transparency measurements oftentimes correspond to increases in chlorophyll *a* and/or color concentrations.

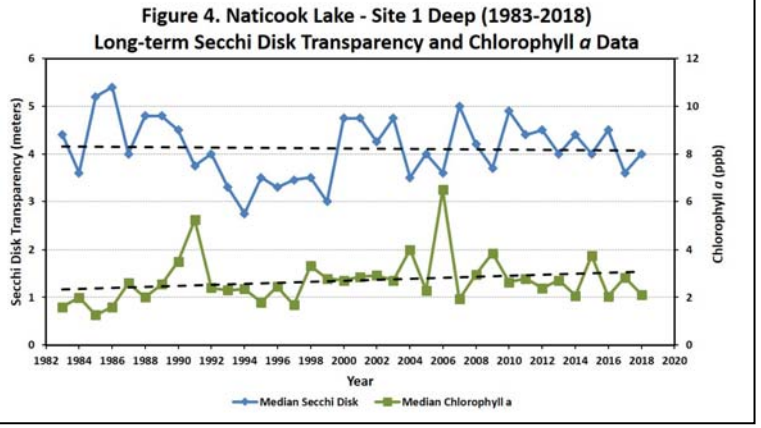
LONG-TERM TRENDS

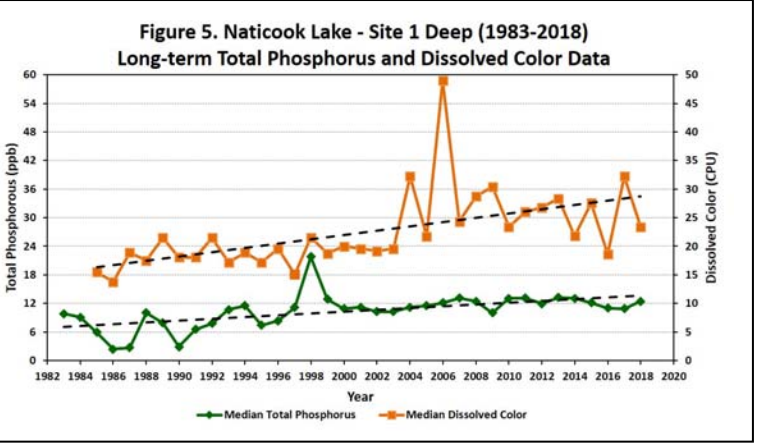
WATER CLARITY: The Naticook Lake water clarity measurements, measured as Secchi Disk transparency, have oscillated among years while the long-term water clarity trend is stable (Figure 4).

CHLOROPHYLL: The Naticook Lake chlorophyll *a* concentrations, a measure of microscopic plant life within the lake, display a trend of increasing concentrations (Figure 4).

TOTAL PHOSPHORUS: Phosphorus is the nutrient most responsible for microscopic plant growth. The Naticook Lake total phosphorus concentrations display a trend of increasing concentrations (Figure 5).

COLOR: The Naticook Lake color data, the result of naturally occurring "tea" color substances from the breakdown of soils and plant materials, display a trend of increasing concentrations (Figure 5).





Figures 4 and 5. Changes in the Naticook Lake water clarity (Secchi Disk depth), chlorophyll *a*, dissolved color, and total phosphorus concentrations measured between 1983 and 2018. **These data illustrate the relationship among plant growth, water color, and water clarity. Total phosphorus data are also displayed and are oftentimes correlated with the amount of plant growth.** Long-term trends are based on the analysis of annual median values.

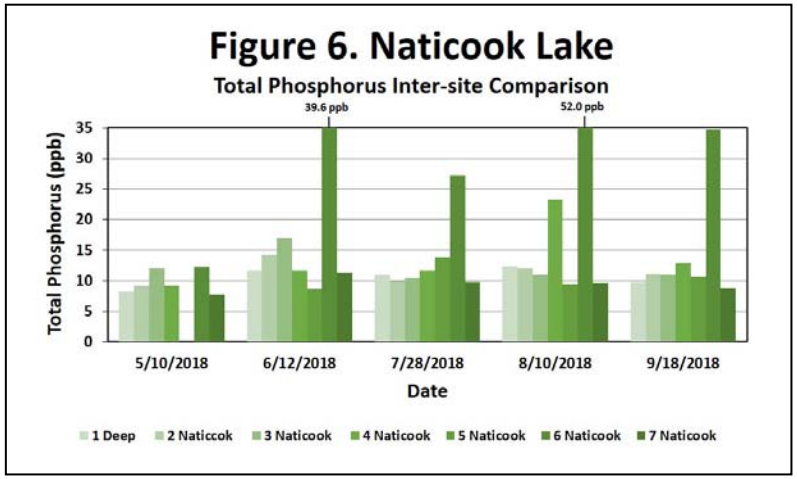
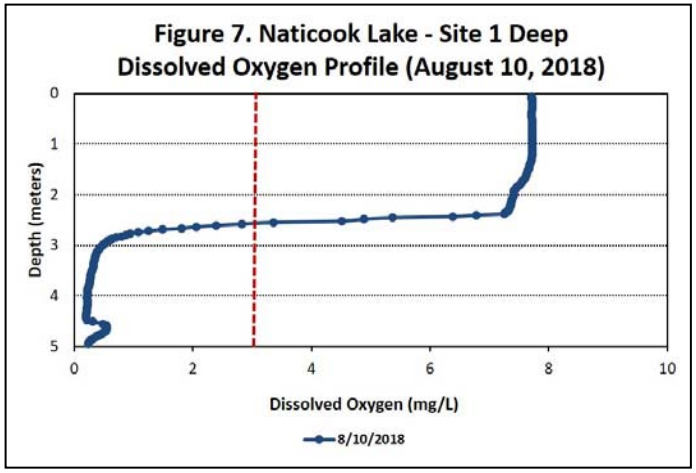


Figure 6. Naticook Lake surface water total phosphorus inter-site comparison. *Notice the difference in total phosphorus concentrations among sampling locations.*

Figure 7. Naticook Lake dissolved oxygen profile collected on August 10, 2018. The vertical red line indicates the dissolved oxygen concentration commonly considered the threshold for successful growth and reproduction of warm water fish such as bass and perch. *Notice the low dissolved oxygen concentrations near the lakebottom.*



Recommendations

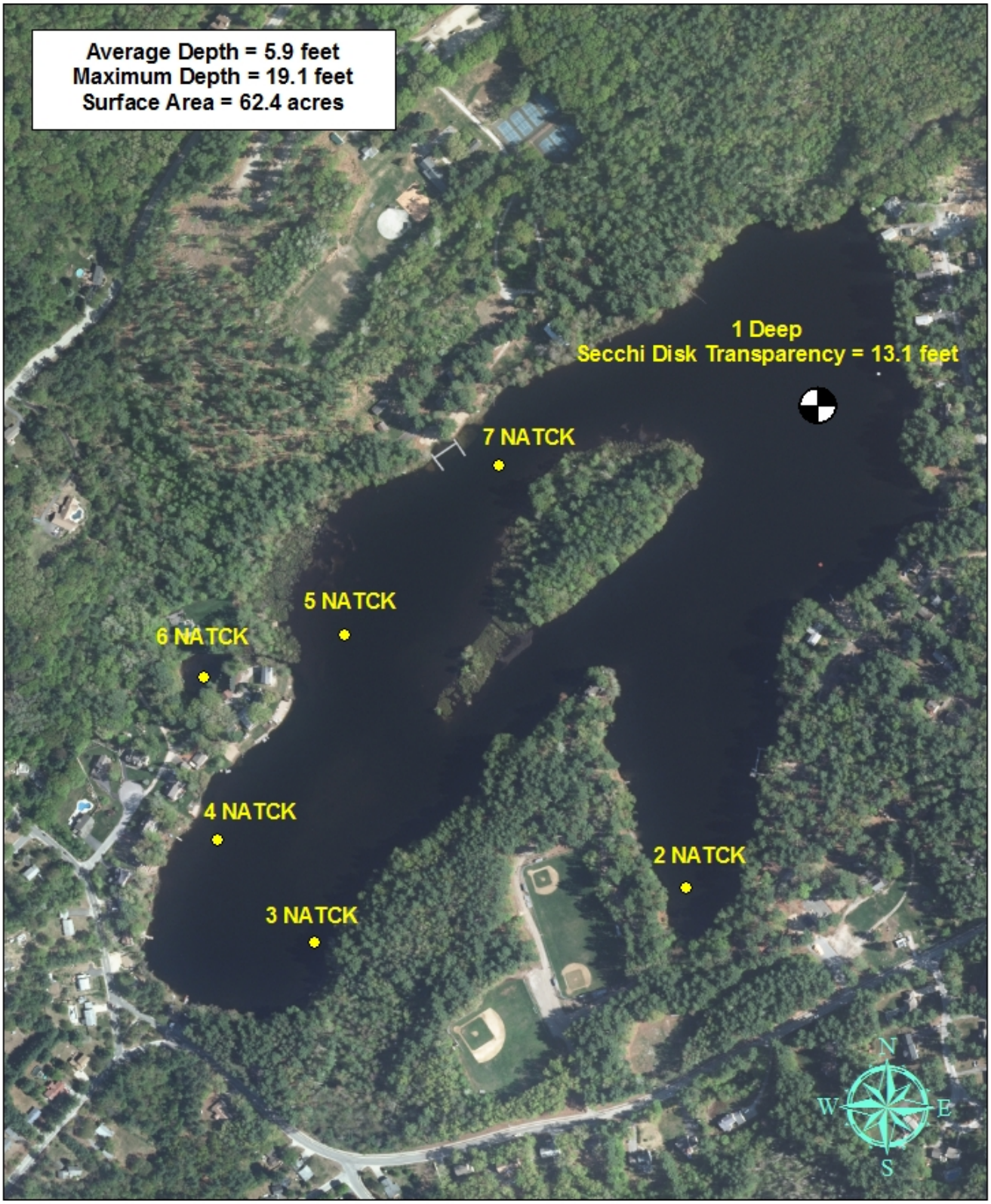
Implement Best Management Practices within the Naticook Lake watershed to minimize the adverse impacts of polluted runoff and erosion on Naticook Lake. Refer to "Landscaping at the Water's Edge: An Ecological Approach" and "New Hampshire Homeowner's Guide to Stormwater Management: Do-It-Yourself Stormwater Solutions for Your Home" for more information on how to reduce nutrient loading caused by overland run-off.

- https://extension.unh.edu/resources/files/Resource004159_Rep5940.pdf
- https://www.des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-11-11.pdf

Figure 8. Naticook Lake

Merrimack, NH

2018 Deep and near-shore sampling sites.



0 0.05 0.1 0.15 0.2 0.25 Miles

Aerial Orthophoto Source: NH GRANIT
Site location GPS coordinates collected by the UNH Center for Freshwater Biology

NH Extension